

Via E-Mail: abele.ralph@epa.gov

April 17, 2018

Mr. Ralph Abele, Chief  
Water Quality Branch  
USEPA Region 1  
5 Post Office Square, Suite 100  
Boston, MA 02109-3912

**Re: Comments on NHDES's Proposed Final 2016 Section 303(d) List of Threatened or Impaired Waters**

Dear Mr. Abele:

Conservation Law Foundation (CLF) appreciates the opportunity to comment on NH Department of Environmental Services' (Department) Proposed Final 2016 Section 303(d) List of Threatened or Impaired Waters (Categorization Document), published by the Department on November 30, 2017. CLF has a strong interest in the health of the Great Bay estuary, including but not limited to Great Bay, Little Bay and the Piscataqua River, each of which are addressed in the above referenced "Categorization" document. CLF submitted comments to NHDES related to the Department's draft 2016 Section 303(d) report published on May 8, 2017, which we hereby incorporate as Attachment 1.

As discussed below, CLF supports the Department's 2016 303(d) categorization of the Cocheco River as impaired relative to Dissolved Oxygen and Total Nitrogen. However, we strongly object to the Department's continued proposal to delist Great Bay, Little Bay and the Upper Piscataqua relative to Total Nitrogen and urge EPA not to approve any such re-categorization of those waters as they relate to Total Nitrogen.

#### Overview

Section 303(d) of the Clean Water Act requires the State of New Hampshire to identify surface waters that are impaired or threatened by a pollutant or pollutants such that they cannot support their designated use. Satisfying the "Aquatic Life" use, one of the designated uses of the numerous water bodies comprising the Great Bay Estuary, requires *inter alia* that:

- (a) The surface waters shall support and maintain a balanced, integrated, and adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of a region.
- (b) Differences from naturally occurring conditions shall be limited to non-detrimental differences in community structure and function.

See Technical Support Document for the Great Bay Estuary Aquatic Life Use Support Assessments, 2016 305(b)/303(d) List at page 5.

By most measures, the health of the Great Bay Estuary has declined significantly over the past 20 years. According to the Piscataqua Region Estuaries Partnership's most recent State of our Estuaries Report, published in December 2017 and available at <http://www.stateofourestuaries.org/2018-reports/sooe-full-report/>, 12 out of 16 indicators of the health of the estuarine system show cautionary or negative trends. While several communities in the watershed have made significant and laudable reductions in nutrient discharges from improved wastewater treatment, the PREP Report states "Nutrient loading is a critical stressor... nutrients remain of high concern, particularly during rainy years where more runoff leads to increased loading" See 2018 State of Our Estuaries Report at 6.

In the two years since DES's 2014 303(d) report, data for six parameters in 18 assessment units in the Great Bay estuary show either no significant improvement or measurable decline. Clearly, the estuarine system is in distress, with detrimental differences in community structure and function as compared to "naturally occurring conditions."

While municipalities around the Great Bay watershed are reducing nitrogen pollution through improved wastewater treatment, wastewater treatment facilities account for 32% of total nitrogen in the estuary as compared to 68% from non-point sources. See Great Bay Nitrogen Non-Point Source Study (June 16, 2014) at 3, available at

<https://www.des.nh.gov/organization/divisions/water/wmb/coastal/documents/gbnnpss-report.pdf>.

Accordingly, there remains a significant load of total nitrogen to waters in the estuary that sets in motion a downward spiral of interrelated biological, chemical, physical and ecological changes including increased proliferation of phytoplankton and macroalgae, increased turbidity, attenuated light penetration, weakened and sparse eelgrass beds, and reduced oyster population.

According to the 2018 PREP SOOE Report at 16, "the average annual load of total nitrogen into the Great Bay Estuary from 2012 to 2016 was 903.1 tons per year", or 43.6 tons per square mile of tidal estuary surface area. This is "much higher than the 14 tons per square mile threshold for eelgrass health indicated in a 2010 study of 62 New England estuaries" See 2018 State of Our Estuaries Report at 8. Given the continued high levels of nutrients from point and non-point sources, the functional impairments excessive nutrients set in motion, and the overwhelming body of evidence that implicates nitrogen as a critical driver of estuarine decline, there is no justification for delisting major portions of the Great Bay estuary as impaired for Total Nitrogen.

#### Numeric v. Narrative Criteria

Certain municipalities, particularly Portsmouth, Dover, and Rochester, have actively engaged in advocacy around nitrogen regulation in the Great Bay estuary. As part of a settlement stemming from a lawsuit brought by the communities against the Department, they secured a commitment for a Peer

Review of the Department's 2009 methodology for establishing numeric nutrient criteria in the Great Bay estuary. Certain interests have characterized the resulting Peer Review as establishing that nitrogen is not causally related to the loss of eelgrass in the estuary, a major sign of eutrophication. This is simply not the case. Quite to the contrary, the Peer Review established only that there are multiple factors at work in the estuary that may be contributing to eutrophication, and that in light of those multiple factors the Department's methodology had not definitively established that excess nitrogen is the *primary* factor causing the decline of eelgrass and the inability for eelgrass to repopulate specific areas. Indeed, the Piscataqua Region Estuaries Partnership has interpreted the Peer Review *not* to mean that data contradict the conclusion that nitrogen is a primary cause of eelgrass loss, but rather that there is insufficient data to conclude it is the primary cause of eelgrass loss. See PREP Presentation to Technical Advisory Committee (Oct. 28, 2016) at 10, available at <http://prepestuaries.org/01/wp-content/uploads/2016/11/tac-meeting-oct28th-slides-and-notes.pdf>.

As stated herein by one of the Peer Review panelists, Vic Bierman:

Our Peer Review opinion was based on the failure of DES to explicitly consider any of the other important, confounding factors in developing their relationships between nitrogen and eelgrass. *The Peer Review did not conclude that nitrogen is not an important factor, but that DES did not present sufficient evidence to support the conclusion that nitrogen was the primary factor that caused eelgrass decline and the inability of eelgrass to repopulate specific areas.*

*Id.* at 10 (emphasis added). It is also important to note that, as stated above, the Peer Review panel was asked to focus on whether nitrogen is the *primary* factor in eelgrass loss. Whether nitrogen is the *primary* factor is irrelevant for purposes of determining nitrogen impairments and management decisions for the estuary. Indeed Jud Kenworthy, one of the Peer Review panelists, has stated that the Peer Review addressed "the wrong question," explaining: "The question could have and should have asked us to deal with the confounding factors instead of just focusing on whether nitrogen was the primary factor." *Id.* It also is noteworthy that the Peer Review itself states:

*[I]mprovements in water quality/ecological health in Great Bay Estuary **can only be obtained by controlling nutrient loads**, not by simply setting numeric nutrient criteria. Such criteria may be beneficial in cases where only narrative criteria exist and progress on nutrient loads is held hostage to endless arguments over how to translate narrative criteria into quantitative criteria. In my opinion, however, numeric criteria are a solution to a regulatory problem, *not a water quality problem.**

Peer Review at 60 (Bierman Response, emphases added), available at <https://scholars.unh.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1001&context=rtr>.

In light of the foregoing, the Peer Review cannot serve as a basis for de-listing nitrogen impairments or for not listing waters as nitrogen-impaired where eelgrass impairments exist.

### Impacts of Climate Change

Listing water bodies as nitrogen-impaired where eutrophic conditions exist – including but not limited to eelgrass loss – also is essential in light of the impacts of climate change. It is well established that

climate-related changes such as increased rainfall and warming water temperatures exacerbate the eutrophication impacts of nitrogen. See, e.g., Nancy N. Rabalais *et al.* "Global change and eutrophication of coastal waters," ICES Journal of Marine Science, 66: 1528-1537 (2009), available at <https://academic.oup.com/icesjms/article/66/7/1528/656749>; Brian Moss, *et al.*, "Allied attack: climate change and eutrophication," Inland Waters, pp. 101-105 (2011), available at <https://www.fba.org.uk/journals/index.php/IW/article/viewFile/359/263>.

Changes such as increasing rainfall are added stressors that already are being observed locally. "Between 1996 and 2014, extreme precipitation (two inches or more in one day) in the Northeast was 53% higher than it was in the previous 94 years" See State of Our Estuaries 2018 at 7. This is a particular concern as the correlation between rainfall and nutrient loads in the estuary is well established.

The highest (nutrient) loads since 2003 were seen in the 2005 to 2007 period, a time that coincides with the highest total annual precipitation values... In comparison, the 2012 to 2016 period exhibited lower rainfall, a contributing factor to the 27% decrease in NPS loading since the 2009-2011 period. Precipitation records and forecasts suggest that our region will continue to see periods of extreme highs and lows, which will continue to impact non-point source load.

See State of Our Estuaries 2018 at 17.

As the impacts of climate change shift the hydrodynamics of the Great Bay Estuary, leading to increased precipitation and water temperatures, it is increasingly important to reduce nitrogen loads from both point and non-point sources to combat the conditions that cause eutrophication. See e.g., Jonathan Lefcheck *et al.* "Multiple stressors threaten the imperiled coastal foundation species eelgrass (*Zostera marina*) in Chesapeake Bay, USA," Global Change Biology (2017), available at <https://pdfs.semanticscholar.org/09d5/aede99ea0d2c66f8372b28c3c7c743c1a7b5.pdf>.

#### Specific Comments

CLF hereby reiterates the following unit-specific comments, which we submitted to the Department on June 23, 2017 regarding its draft 2016 Section 303(d) Report.

#### **Cocheco River**

CLF strongly supports the Department's 2016 relisting of the Cocheco River as impaired with respect to Dissolved Oxygen and Total Nitrogen. We particularly concur with the rationale for relisting with respect to Total Nitrogen, as set forth in the Technical Support Document narrative description where elevated Nitrogen is associated with indicators of eutrophication even if it is not proven to be solely responsible:

It is not clear at this time whether the measured high chlorophyll and low DO is solely the result of current loads of nitrogen or if the historically much higher loads are still flushing through the ecosystem. Some of the classic indicators of nutrient eutrophication are present in this assessment zone and total nitrogen remains elevated. The newer datasets provide a more robust set of indicators of eutrophication than were available for the 2014 assessment and those response datasets demonstrate sufficient

power to determine that the eutrophication effects on designated uses can be attributed to total nitrogen.

Technical Support Document for the Great Bay Estuary Aquatic Life Use Support Assessments, 2016 305(b) Report/303(d) List, Nov 30, 2017 at 54.

This support for relisting is consistent with CLF's 2017 comments on the Department's *Categorization of Unassessed Waters in the Draft 2014 Section 303(d) List of Threatened or Impaired Waters*, appended as Attachment 7, which CLF hereby incorporates into these comments as if fully set forth herein, which urged the Department not to delist the Cocheco River for Total Nitrogen.

### **Great Bay**

CLF strongly objects to the Department's decision to delist Great Bay relative to Total Nitrogen on the ground that nitrogen cannot be conclusively identified as the sole cause of impairment and to thereby re-categorize this Estuary Assessment Zone as "3-PNS Potentially Not Supporting".

The *Technical Support Document for the Great Bay Estuary Aquatic Life Use Support Assessments, 2016 305(B) Report/303(d) List* acknowledges elevated chlorophyll-a levels, degraded eelgrass beds, poor light attenuation, and adverse impacts of microalgae and epiphytes. It further states: "Some of the classic indicators of nutrient eutrophication are present in this assessment zone and total nitrogen remains elevated in portions of the assessment zone. As the discussion above illustrates, there is a clear nutrient "signature" in the data.

Technical Support Document for the Great Bay Estuary Aquatic Life Use Support Assessments, 2016 305(b) Report/303(d) List, Nov 30, 2017 at 33.

Despite these indicators of impairment, the Report concludes:

It is less clear, at this time, whether the response datasets demonstrate sufficient power to determine that the eutrophication effects on designated uses can be attributed to total nitrogen alone. Given that uncertainty, impairment is not warranted under New Hampshire's narrative standard. As such, this assessment zone has been assessed as Insufficient Information – Potentially Not Supporting (3-PNS) for total nitrogen.

Technical Support Document for the Great Bay Estuary Aquatic Life Use Support Assessments, 2016 305(b) Report/303(d) List, Nov 30, 2017 at 33.

As set forth in CLF's February 24, 2017 comments (Attachment 7), there is simply no basis in law for requiring that a single pollutant, *on its own*, cause the violation of a water quality standard in order to be listed as a cause of an impairment. The Comprehensive Assessment and Listing Methodology (CALM) makes clear that the term "cause," as an assessment term, is a pollutant "which is causing, or threatening to cause, a water quality violation." CALM at 15. Nowhere does it require a pollutant – such as Total Nitrogen – to be the *sole* cause of impaired conditions.

In EPA's review of NHDES's 2012 Section 303(d) List, it asserted that data supported continued listing of

Great Bay as impaired for Total Nitrogen.

The data relating to nitrogen enrichment response variables (e.g. eelgrass bed decline, low levels of dissolved oxygen, chlorophyll-a values, macroalgae, light attenuation values), when viewed in conjunction with the total nitrogen data obtained through monitoring, provides strong support for *continued* 303(d) listing of the Great Bay Estuary waters in question and provides a clear picture of an estuary that is facing strong eutrophication pressure.

USEPA Letter to NHDES September 24, 2015 Re: 2012 303(d) List, Attachment A - EPA Technical Support Document at 7.

With NHDES's current retention of impaired status for Great Bay relative to eelgrass and water clarity, (See Technical Support Document for the Great Bay Estuary Aquatic Life Use Support Assessments, 2016 305(b) Report/303(d) List, Nov 30, 2017 at 32) and PREP's assessment that there has been an 11% increase in seaweeds between 1980 and 2016 (See 2018 SOOE Report at 21), EPA's rationale for continued listing of Great Bay as impaired for Total Nitrogen applies equally now as it did in 2015. For the reasons set forth herein, and in CLF's comments provided as Attachment 7, Great Bay must be listed as violating water quality standards ("impaired") for total nitrogen. The Environmental Protection Agency (EPA) should disapprove the Department's proposed re-categorization of Great Bay relative to this pollutant.

### **Little Bay**

As stated above with respect to Great Bay, CLF strongly objects to the Department's decision to delist Little Bay relative to Total Nitrogen on the ground that nitrogen cannot be conclusively identified as the sole cause of impairment and to thereby re-categorize this Estuary Assessment Zone as "3-PNS Potentially Not Supporting"

According to the Technical Support Document on page 40: The eelgrass beds are severely degraded (100% reduction from historic) and the available light attenuation is poor. "Additionally, "Burdick et al. (Burdick, Mathieson, Peter, & Sydney, 2016) note that "Monitoring results from 2014 show high levels of cover of nuisance green and red algae... at all sites except near the mouth of the estuary.... "[a]t this time there are some of the classic indicators of nutrient eutrophication present in this assessment zone and nitrogen remains elevated."

Technical Support Document for the Great Bay Estuary Aquatic Life Use Support Assessments, 2016 305(b) Report/303(d) List, Nov 30, 2017 at 40.

Despite these data, DES concludes that Little Bay is classified 3-PNS for nitrogen because "there are insufficient response datasets leading to the determine (*sic.*) that eutrophication by total nitrogen is alone is not know to be strong enough (*sic.*) to warrant impairment under NH's narrative standard."

As stated above for Great Bay, there is no basis in law for requiring that a single pollutant, *on its own*, cause the violation of a water quality standard in order to be listed as a cause of impairment. In light of the foregoing, Little Bay must be included on the Section 303(d) list as impaired for total nitrogen. We urge EPA to disapprove the Department's proposed recategorization of Little Bay from 5-M to 3-PNS.

## Upper Piscataqua River

As stated above with respect to Great Bay and Little Bay, CLF strongly objects to the Department's decision to delist the Upper Piscataqua River relative to Total Nitrogen on the ground that nitrogen cannot be conclusively identified as the sole cause of impairment and to thereby re-categorize this Estuary Assessment Zone as "3-PNS Potentially Not Supporting".

The Upper Piscataqua River has lost 100% of its eelgrass from historical levels and nearly 70% since 1990, and water clarity is poor. The Technical Support Document states that "at this time there are some of the classic indicators of nutrient eutrophication present in this assessment zone and total nitrogen remains high" at 71. While nutrient load in this assessment zone are decreasing due to wastewater treatment upgrades in Rochester and Dover, future impacts of such reductions do not provide a basis for de-listing where designated use for Aquatic Life Support is not being met.

NHDES concludes that "there are insufficient response datasets to determine that the eutrophication by total nitrogen alone is not known to be strong enough to warrant impairment under New Hampshire's narrative standard (sic)" at 71. Again, there is no basis in law for requiring that a single pollutant, on its own, cause the violation of a water quality standard in order to be listed as a cause of impairment. For the above reasons, the Upper Piscataqua River must be listed as impaired for total nitrogen. The Environmental Protection Agency (EPA) should disapprove the Department's proposed de-listing of the Upper Piscataqua River as 3-PNS relative to Total Nitrogen.

\* \* \*

For the reasons set forth above, CLF urges EPA to approve the Department's proposed listing of the Cocheco River as impaired for Total Nitrogen, and to *disapprove* the Department's proposed de-listing of Great Bay, Little Bay and the Upper Piscataqua River as impaired relative to Total Nitrogen. Thank you for the opportunity to provide these comments.

Respectfully submitted,



Tom Irwin  
V.P. and CLF New Hampshire Director



Melissa Paly  
Great Bay – Piscataqua Waterkeeper

## Attachments

Attachment 1 – June 23, 2017 CLF comments to NHDES on 2016 303(d)

Attachment 2 - February 24, 2017 Comments to NHDES re "Categorization of Unassessed Waters in the Draft 2014 Section 303(d) List of Threatened or Impaired Waters"

**Attachment 1 – June 23, 2017 CLF comments to NHDES regarding NHDES DRAFT 2016 Section 305(b) and 303(d) Surface Water Quality Report List of Threatened or Impaired Waters**

Via E-Mail: [303dcomme@des.state.nh.us](mailto:303dcomme@des.state.nh.us)

June 23, 2017

2016, 303(d) Comments  
NH Department of Environmental Services  
Watershed Management Bureau  
29 Hazen Drive, P.O. Box 95  
Concord, NH 03302-0095

Attn: Ken Edwardson

Re: Comments on NHDES DRAFT 2016 Section 305(b) and 303(d) Surface Water Quality Report List of Threatened or Impaired Waters

Conservation Law Foundation (CLF) appreciates the opportunity to comment on the NH Department of Environmental Services' Draft 2016 Section 303(d) and 303(d) Surface Water Quality Report

List of Threatened or Impaired Waters, published by the Department on May 8, 2017. CLF is a member-supported environmental advocacy group that works to solve environmental problems facing communities and natural resources in New Hampshire and throughout New England. CLF and its members have a strong interest in restoring and maintaining the health of the Great Bay Estuary and the rivers that feed it. For more than 10 years, CLF has engaged in concerted, ongoing efforts to address and reduce threats to the health of the Great Bay Estuary, which is recognized as an estuary of national significance under Section 320 of the Clean Water Act.

Section 303(d) of the Clean Water Act requires the State of New Hampshire to identify surface waters that are impaired or threatened by a pollutant or pollutant(s) such that they cannot support their designated use. Satisfying the "Aquatic Life" use, one of the designated uses of the numerous water bodies comprising the Great Bay Estuary, requires *inter alia* that:

- (a) The surface waters shall support and maintain a balanced, integrated, and adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of a region.
- (b) Differences from naturally occurring conditions shall be limited to non-detrimental differences in community structure and function

See Technical Support Document for the Great Bay Estuary Aquatic Life Use Support Assessments, 2016 305(b)/303(d) List at page 5.

By many measures, the health of the Great Bay Estuary has declined significantly over the past 20 years. According to the Piscataqua Region Estuaries Partnership's most recent State of our Estuaries Report, published in 2013 and provided herewith as Attachment 1, 15 out of 22



indicators of the health of the estuarine system show cautionary or negative trends. Since the previous report in 2010, concentrations of nitrogen and macroalgae had increased, dissolved

#### **Attachment 1, continued**

oxygen in the Estuary's tidal streams was often below levels necessary to support marine life, water clarity in many areas was adversely affected by suspended sediment, and the amount of eelgrass throughout the system had declined. The 2013 report concluded that the Great Bay Estuary shows all the classic signs of eutrophication.

In the two years since DES's last 303(d) report in 2014, only one assessment zone out of the 19 that are described in the Technical Support Document for the Great Bay Estuary Aquatic Life Use Support Assessment, 2016 305(b)/303(d) report – can be delisted for improvement for one water quality indicator. According to the narrative description, the Oyster River has not experienced “large chlorophyll-A blooms for many years,” which the Department determined justifies a reclassification of this assessment zone from impaired to marginally fully supporting. The data for six parameters in 18 other assessment zones show either no significant improvement or measurable decline. Clearly, the Great Bay Estuary is a system in distress, with detrimental differences in community structure and function as compared to “naturally occurring conditions.”

While municipalities around Great Bay and the Piscataqua River are reducing nitrogen pollution through improved wastewater treatment, wastewater treatment facilities account for 32% of total nitrogen in the estuary as compared to 68% from non-point sources. *See Great Bay Nitrogen Non-Point Source Study (June 16, 2014) at 3.* Accordingly, there remains a significant load of total nitrogen to waters in the estuary.

Certain municipalities, particularly Portsmouth, Dover, and Rochester, have actively engaged in advocacy around nitrogen regulation in the Great Bay estuary. As part of a settlement stemming from a lawsuit brought by the communities against the Department, they secured a commitment for a Peer Review of the Department's 2009 methodology for establishing numeric nutrient criteria in the Great Bay estuary. Certain interests have characterized the resulting Peer Review as establishing that nitrogen is not causally related to the loss of eelgrass in the estuary, a major sign of eutrophication. This is simply not the case. Quite to the contrary, the Peer Review established only that there are multiple factors at work in the estuary that may be contributing to eutrophication, and that in light of those multiple factors the Department's methodology had not definitively established that excess nitrogen is the *primary* factor causing the decline of eelgrass and the inability for eelgrass to repopulate specific areas. Indeed, the Piscataqua Region Estuaries Partnership has interpreted the Peer Review *not* to mean that data contradict the conclusion that nitrogen is a primary cause of eelgrass loss, but rather that there is insufficient data to conclude it is the primary cause of eelgrass loss. *See PREP Presentation to Technical Advisory Committee (Oct. 28, 2016) (Attachment 2) at 9.* Indeed, one of the Peer Review panelists, Vic Bierman, agrees:

“Our Peer Review opinion was based on the failure of DES to explicitly consider any of the other important, confounding factors in developing their relationships between nitrogen and eelgrass. *The Peer Review did not conclude that nitrogen is not an important factor, but that DES did not present sufficient evidence to support the conclusion that nitrogen was the primary factor that caused eelgrass decline and the inability of eelgrass to repopulate specific areas.*”

*Id.* at 10 (emphasis added). It is also important to note that, as stated above, the Peer Review panel was asked to focus on whether nitrogen is the *primary* factor in eelgrass loss. Whether nitrogen is

**Attachment 1, continued**

the *primary* factor is irrelevant for purposes of determining nitrogen impairments and management decisions for the estuary. Indeed, one of the Peer Review panelists, Jud Kenworthy, agrees that Peer Review addressed “the wrong question,” stating: “The question could have and should have asked us to deal with the confounding factors instead of just focusing on whether nitrogen was the primary factor.” *Id.* It also is noteworthy that the Peer Review itself states:

[I]mprovements in water quality/ecological health in Great Bay Estuary **can only be obtained by controlling nutrient loads**, not by simply setting numeric nutrient criteria. Such criteria may be beneficial in cases where only narrative criteria exist and progress on nutrient loads is held hostage to endless arguments over how to translate narrative criteria into quantitative criteria. In my opinion, however, numeric criteria are a solution to a regulatory problem, *not a water quality problem*.

Peer Review at 60 (Bierman Response), provided as Attachment 3 (emphases added).

In light of the foregoing, the Peer Review cannot serve as a basis for de-listing nitrogen impairments or for not listing waters as nitrogen-impaired where eelgrass impairments exist.

Listing water bodies as nitrogen-impaired where eutrophic conditions exist – including but not limited to eelgrass loss – also is essential in light of the impacts of climate change. It is well established that climate-related changes such as increased rainfall and warming water temperatures exacerbate the eutrophication impacts of nitrogen. *See, e.g.,* Nancy N. Rabalais *et al.* “Global change and eutrophication of coastal waters,” *ICES Journal of Marine Science*, 66: 1528-1537 (2009), appended as Attachment 4; Brian Moss, *et al.*, “Allied attack: climate change and eutrophication,” *Inland Waters*, pp. 101-105 (2011), appended as Attachment 5.

Changes such as increasing rainfall are added stressors that already are being observed locally. A 2014 graph by the National Climatic Data Center of State-Averaged Total Annual Precipitation for New Hampshire 1895-2013 shows 4 of the 5 wettest years on record occurred since 2005. Appended as Attachment 6.

As impacts of climate change shift the hydrodynamics of the Great Bay Estuary, it is increasingly important to reduce nitrogen loads from both point and non-point sources to combat the conditions that cause eutrophication.

## **Attachment 1, continued**

CLF provides the following assessment-unit-specific comments below, incorporating therein by reference all of the comments above:

### **Cocheco River**

CLF strongly supports the Department's 2016 relisting of the Cocheco River as Impaired with respect to Dissolved Oxygen and Total Nitrogen. We particularly concur with the rationale for relisting with respect to Total Nitrogen in the narrative description at 55, where elevated Nitrogen is associated with indicators of eutrophication even if it is not proven to be solely responsible:

"It is not clear at this time whether the measured high chlorophyll and low DO is solely the result of current loads of nitrogen or if the historically much higher loads are still flushing through the ecosystem. Some of the classic indicators of nutrient eutrophication are present in this assessment zone and total nitrogen remains elevated. The newer datasets provide a more robust set of indicators of eutrophication than were available for the 2014 assessment and those response datasets demonstrate sufficient power to determine that the eutrophication effects on designated uses can be attributed to total nitrogen."

This support for relisting is consistent with CLF's 2017 comments on the Department's *Categorization of Unassessed Waters in the Draft 2014 Section 303(d) List of Threatened or Impaired Waters*, appended as Attachment 7, which CLF hereby incorporates into these comments as if fully set forth herein, urging the Department not to delist the Cocheco River for Total Nitrogen.

### **Great Bay**

CLF strongly objects to the conclusion cited for Great Bay that, because nitrogen cannot be conclusively identified as the sole cause of impairment, the Department assigns this Estuary Assessment Zone a "3-PNS Potentially Not Supporting" status.

The *Technical Support Document for the Great Bay Estuary Aquatic Life Use Support Assessments, 2016 305(B) Report/303(d) List* acknowledges elevated chlorophyll-a levels, degraded eelgrass beds, poor light attenuation, and adverse impacts of microalgae and epiphytes. It further states:

*"Some of the classic indicators of nutrient eutrophication are present in this assessment zone and total nitrogen remains elevated in portions of the assessment zone. As the discussion above illustrates, there is a clear nutrient "signature" in the data."*

Technical Support Document at page 34. Despite these indicators of impairment, the Report concludes:

*"It is less clear, at this time, whether the response datasets demonstrate sufficient power to determine that the eutrophication effects on designated uses can be attributed to total nitrogen alone. Given that uncertainty,*

**Attachment 1, continued**

*impairment is not warranted under New Hampshire's narrative standard. As such, this assessment zone has been assessed as Insufficient Information – Potentially Not Supporting (3-PNS) for total nitrogen."*

As set forth in CLF's February 24, 2017 comments appended as Attachment 7, there is simply no basis in law for requiring that a single pollutant, *on its own*, cause the violation of a water quality standard in order to be listed as a cause of an impairment. The Comprehensive Assessment and Listing Methodology (CALM) makes clear that the term "cause," as an assessment term, is a pollutant "which is causing, or threatening to cause, a water quality violation." CALM at 15. Nowhere does it require a pollutant – such as Total Nitrogen – to be the *sole* cause of impaired conditions.

For the reasons set forth herein, and in CLF's comments provided as Attachment 7, Great Bay must be listed as violating water quality standards ("impaired") for total nitrogen.

**Little Bay**

As stated above with respect to Great Bay, CLF strongly objects to the conclusion that, because nitrogen cannot be conclusively identified as the sole cause of impairment Little Bay, the Department assigns this Estuary Assessment Zone a "3-PNS Potentially Not Supporting" status.

According to the Technical Support Document on page 41, "The historical extent of eelgrass in this assessment zone was 252 acres ... The median current extent of eelgrass in 2014-2016 is 0 acres, which is a decrease of 100%." Additionally, the zone is classified as impaired for water clarity. Several sites within Little Bay show high levels of nuisance green and red algae (*Ulva* and *Gracilaria*), which may be early warning signs of expected changes in phytoplankton (McGlathery, Sundbäck, & Anderson, 2007) (Valiela, et al, 1997). The document states on page 41 that "At this time there are some of the classic indicators of nutrient eutrophication present in this assessment zone and nitrogen remains elevated." Despite these data, DES concludes that Little Bay is classified 3-PNS for nitrogen because "there are insufficient response datasets leading to the determine (sic) that eutrophication by total nitrogen is alone is not know to be strong enough (sic) to warrant impairment under NH's narrative standard."

As stated above for Great Bay, there is no basis in law for requiring that a single pollutant, *on its own*, cause the violation of a water quality standard in order to be listed as a cause of impairment. In light of the foregoing, Little Bay must be included on the Section 303(d) list as impaired for total nitrogen.

**Upper Piscataqua River**

Like Little Bay, the Upper Piscataqua has lost 100% of its eelgrass from historical levels and nearly 70% since 1990, and water clarity is poor. That the nutrient load in this assessment zone is rapidly decreasing due to wastewater treatment upgrades does not mitigate the fact that the Upper Piscataqua shows classic indicators of nutrient eutrophication and total nitrogen remains high. As discussed in the

overview portion of CLF's comments, the nutrient load from wastewater treatment facilities contributes 32% of the Nitrogen in the Great Bay Estuary, with the remaining 68% attributable to non-point sources.

#### **Attachment 1, continued**

Again, there is no basis in law for requiring that a single pollutant, *on its own*, cause the violation of a water quality standard in order to be listed as a cause of impairment. For the above reasons, the Upper Piscataqua River must be listed as impaired for total nitrogen.

#### **Winnicutt River, Bellamy River, Sagamore Creek**

Each of these assessment zones is severely impaired for eelgrass, with decreases between 74-100% over the historic extent. Because there is little to no data in the Technical Support Document on other indicators in these Assessment Zones, Total Nitrogen is assessed as 3-ND. Given the data about nitrogen loading in the Great Bay Estuary generally, the known relationship of Nitrogen as one of the stressors of eelgrass, the increasing risk of eutrophication due to impacts of climate change, and the established fact that nitrogen need not be identified as the primary cause of eelgrass decline, CLF urges DES to assess these water bodies as Impaired for Total Nitrogen.

\* \* \*

For the reasons set forth above, CLF supports the Department's listing of the Cocheco River as impaired for Total Nitrogen and urges the Department to identify Great Bay, Little Bay, the Upper Piscataqua River, Bellamy River, Winnicut River and Sagamore Creek as impaired for this pollutant of such significant concern to the health of these water bodies and the estuary as a whole. Thank you for the opportunity to provide these comments.

Respectfully submitted,



Tom Irwin  
V.P. and CLF New Hampshire Director

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**Attachment 2 – February 24, 2017 Comments to NHDES re “Categorization of Unassessed Waters in the Draft 2014 Section 303(d) List of Threatened or Impaired Waters”**

Via E-Mail: [303dcomme@des.state.nh.us](mailto:303dcomme@des.state.nh.us)

February 24, 2017

2014, 303(d) Comments  
NH Department of Environmental Services  
Watershed Management Bureau  
29 Hazen Drive, P.O. Box 95  
Concord, NH 03302-0095

Attn: Ken Edwardson

**Re: Categorization of Unassessed Waters in the Draft 2014 Section 303(d) List of Threatened or Impaired Waters**

Conservation Law Foundation (CLF) appreciates the opportunity to comment on the NH Department of Environmental Services’ (Department) Categorization of Unassessed Waters in the Draft 2014 Section 303(d) List of Threatened or Impaired Waters (Categorization Document), published by the Department on February 3, 2017. CLF has a strong interest in the health of the Great Bay estuary, including but not limited to Great Bay and the Lamprey and Cocheco Rivers, each of which are addressed in the above referenced “Categorization” document. CLF has previously submitted comments related to the Department’s development of the State of New Hampshire’s 2014 Section 303(d) List, which we hereby fully incorporate by reference.

As discussed below, CLF supports the Department’s final 303(d) categorization of the Lamprey River (South) relative to Total Nitrogen. However, we strongly object to the Department’s categorizations of Great Bay and the Cocheco River relative to Total Nitrogen and urge the Department to re-categorize those waters as impaired for such pollutant.

**Lamprey River South**

As the Department’s Categorization Document demonstrates, the Lamprey River South assessment zone has experienced high median Total Nitrogen concentrations from 2008 through 2013; has been measured with a high concentration of chlorophyll-a; has experienced the elimination of eelgrass; and is surrounded by assessment units upstream and downstream that are impaired due to poor light attenuation coefficient. The Categorization document further explains that whereas there is a lack of data specific to the Lamprey River South assessment zone, data from neighboring assessment zones are sufficiently robust:

The upstream Lamprey River North assessment zone has extensive datasets demonstrate[ing] impairments due to high chlorophyll-a and severely depleted dissolved oxygen. The downstream Great Bay assessment zone has marginally (*sic.*) chlorophyll-a and dissolved oxygen due to the severely poor condition coming out of the Squamscott River assessment zone as well as degraded eelgrass, poor light transmittance, and evidence of macroalgae proliferation. Taken in totality, there is insufficient evidence to remove the 2012 Total Nitrogen impairment.

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CLF agrees with this determination and strongly supports the Department's decision to retain the Lamprey River South assessment zone on the 2014 Section 303(d) List as impaired for Total Nitrogen.

### **Great Bay**

The Department's Categorization Document recites compelling data evidencing that Great Bay's aquatic life use is impaired as a result of Total Nitrogen. Such data include:

- Total Nitrogen concentrations acknowledged by the Department to be "elevated."
- Southwestern portions of the bay with poor dissolved oxygen, at a level the Department classifies as "something worse than 'Moderately impaired health' . . . ."
- Chlorophyll-a levels that the Department considers "marginally impaired due to peak concentrations . . . and could even be considered in the group of 'Significant Impaired health' given that the area 'supports large phytoplankton blooms' . . . ."
- "The eelgrass beds are degraded and the available light attenuation . . . is poor."
- "[S]trong evidence that macroalgae proliferation is impacting eelgrass and changing the species composition and diversity in Great Bay."
- Loss of eelgrass in the intertidal zone "consistent with smothering by macroalgae."
- Detailed observations by Dr. Arthur Mathieson about the presence of macroalgae in the estuary, particularly Great Bay proper, and extensive epiphytic growth, as well as a 2016 paper by Burdick et al. noting "Monitoring results from 2014 show high levels of cover of nuisance green and red algae . . . at all sites except near the mouth of the Estuary."

The above data demonstrate that Total Nitrogen is causing impairment of Great Bay.<sup>1</sup> Indeed, the Categorization Document admits this fact, stating: "Some of the classic indicators of nutrient eutrophication are present in this assessment zone and Total Nitrogen remains elevated. As the discussion above indicates, there is a clear nutrient 'signature' in the data."

Despite all of the foregoing, the Department's Categorization Document states: "It is less clear, as (*sic.*) this time, whether the response datasets demonstrate sufficient power to determine that the eutrophication effects on designated uses can be attributed to Total Nitrogen alone." On this basis, as well as the basis that it has elected not to employ its previously relied-upon numeric criteria for Total Nitrogen, it proposes to de-list Great Bay's impairment status relative to Total Nitrogen. Such action, if finalized, would be arbitrary and capricious and incorrect as a matter of law for the following reasons:

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<sup>1</sup> Other data support this conclusion, including recent reports by Dr. Frederick T. Short prepared for the Piscataqua Region Estuaries Partnership, *Eelgrass Distribution and Biomass in the Great Bay Estuary for 2015* (Sept. 22, 2016) and *Eelgrass Distribution in the Great Bay Estuary for 2014* (Jan. 22, 2106), provided herewith; as well as the recent report *Monitoring Macroalgae in the Great Bay Estuary for 2015*, David M. Burdick et al. (Feb. 14, 2017), publicly available at <http://scholars.unh.edu/cgi/viewcontent.cgi?article=1364&context=prep>; and data and statements by the Department itself relative to eelgrass and Total Nitrogen (note in particular the Department's statement about dissolved inorganic nitrogen as a component of Total Nitrogen) appended hereto (accessed online Feb. 24, 2017). See also the Department's February 9, 2017 public statement that "A long-term decline in eelgrass in the #GreatBay threatens survival of many species," appended hereto.

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- The Comprehensive Assessment and Listing Methodology (CALM) makes clear that both indicators of nutrients (e.g., the presence of nitrogen in estuarine waters) and associated eutrophication impacts, namely low dissolved oxygen, eelgrass extent, chlorophyll-a concentrations, macroalgae, epiphytes and water clarity, are relevant factors. See CALM at 65-69. The eutrophic conditions described in the Categorization Document, combined with elevated Total Nitrogen levels, do not support de-listing Great Bay relative to Total Nitrogen impairment. To the contrary, they require that Great Bay continue to be listed as Total Nitrogen-impaired.
- The CALM further makes clear that “the most direct link between nutrient inputs to an estuary and eutrophic effects is for (*sic.*) chlorophyll-a concentration in the water and macroalgae growth;” that “elevated chlorophyll-a concentrations and proliferation of macroalgae are primary symptoms of eutrophication;” and that assessment units are impaired for nutrients pursuant to Env-Wq 1703.14 “*if there is an impairment for one of the primary symptoms of eutrophication.*” See CALM at 43. The strong presence of macroalgae, and certainly the strong presence of macroalgae combined with the presence of chlorophyll-a, establish that Great Bay is impaired for primary symptoms of eutrophication and therefore must be deemed nutrient-impaired. That the above-quoted language pertains to primary contact recreation uses is of no consequence.
- The determination to de-list Great Bay as Total Nitrogen-impaired is erroneous because it is based on the conclusion that there is insufficient data to determine that Total Nitrogen, “*alone,*” is the cause of eutrophic conditions. Categorization Document at 3 (emphasis added). First, the Categorization Document fails to support this factual conclusion. Second, and perhaps more importantly, there is no basis in law for establishing that a single pollutant, *on its own*, cause the violation of a water quality standard in order to be the cause of an impairment. The CALM makes clear that the term “cause,” as an assessment term, is a pollutant “which is causing, or threatening to cause, a water quality violation.” CALM at 15. Nowhere does it require a pollutant – such as Total Nitrogen – to be the *sole* cause of impaired conditions. See *also* CLF’s December 11, 2015 Comments on the Draft 2014 Section 303(d) List of Impaired Surface Waters at 2-3, including the EPA New England’s Technical Support Document appended thereto.
- The Department cannot properly rely on the referenced “court settlement” (Docket No. 2013-0119) as a basis for de-listing, particularly absent a new methodology for establishing numeric criteria to replace its previous one. See *generally id.*
- To the extent the Department relies on the peer review that resulted from the court settlement as a basis for its determination, such review did *not* conclude that Total Nitrogen is not a factor in the Great Bay estuary’s declining health.

### Cochecho River

As with Great Bay, the Department’s Categorization Document recites compelling data evidencing that the Cochecho River’s aquatic life use is impaired as a result of Total Nitrogen. Such data include:

- Median Total Nitrogen from 2008 through 2013 of 600 ug/L, a level acknowledged by the Department to be “elevated,” a level well in excess of the 390 – 500 ug/L range “to be in good to fair health or worse depending upon the condition of the other eutrophication indicators,” and a level far in excess of the 390 ug/L median Total Nitrogen target established for the Massachusetts Estuaries Project.



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- Dissolved oxygen concentrations occasionally below 5 mg/L.
- Chlorophyll-a concentrations that could be considered marginally impaired.
- Chlorophyll-a biomass that can be “very high depending on the timing of the tide cycle.”
- Acknowledgment that although there are no documented records of eelgrass presence in the river, systems with Total Nitrogen concentrations exceeding 500 ug/L experience declines in animal communities and macroalgae accumulations that begin to affect aesthetic quality – placing such systems into a “moderately impaired health” category.

The above data demonstrate that Total Nitrogen is causing impairment of the Cocheco River. Indeed, the Categorization Document admits this fact, stating: “Some of the classic indicators of nutrient eutrophication are present in this assessment zone and Total Nitrogen remains elevated. As the discussion above indicates, there is a clear nutrient ‘signature’ in the data.”

Despite all of the foregoing, the Department’s Categorization Document states: “It is less clear, as (*sic.*) this time, whether the response datasets demonstrate sufficient power to determine that the eutrophication effects on designated uses can be attributed to Total Nitrogen alone.” On this basis, as well as the basis that it has elected not to employ its previously relied-upon numeric criteria for Total Nitrogen, it proposes to de-list the Cocheco River’s impairment status relative to Total Nitrogen. For all of the reasons set forth in these comments relative to Great Bay, *see supra*, such action, if finalized, would be arbitrary and capricious and incorrect as a matter of law.

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For the reasons set forth above, Lamprey River South, Great Bay, and the Cocheco River should each retain their impairment status with respect to Total Nitrogen. In each water body, there is sufficient evidence that Total Nitrogen is causing or contributing to impairment of aquatic life uses; to the contrary, there is no evidence to reasonably and lawfully support the de-listing of Total Nitrogen as a cause of impairment. We urge the Department to conform its final listing proposal accordingly.

Respectfully submitted,



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